4. CONTAMINATION SITE CPP-82

Information presented in the following subsections was extracted from *Track 1 Documentation Decision Packages for WAG 3 OU 3-12 Site CPP-82* (WINCO 1992b) and the white paper evaluation by SAIC (SAIC 2000c).

4.1 Summary

Site CPP-82 (abandoned 1.5-in. line, PLA-776, west of Beech Street) is the location of three excavation-related buried pipeline incidents that occurred in August and September 1987 (designated Locations A, B, and C) during excavation for the construction of Building CPP-797, which would replace service waste buildings CPP-734 and CPP-709 (see Figures 2-1, 4-1, and 4-2). Location A involved the rupture of an abandoned line and the release of 2.5 gal of low-level radioactive liquid waste. Locations B and C are associated with the release of nonradioactive, nonhazardous waste water; these spills occurred during the repair activities associated with Location A. The Track 1 decision documentation (WINCO 1992b), approved in 1993, determined that "No Further Action" was justified. At the time of issuing the OU 3-13 ROD, Site CPP-82 was transferred to OU 3-14 for further evaluation (DOE-ID 1999).

4.2 Incident at Location A

During excavation for the construction of Building CPP-797 in August of 1987, a backhoe struck and ruptured an abandoned underground line, PLA-776 (1.5-in. stainless steel pipe). This locale, known as Location A, is located approximately 20 ft east of CPP-797 where the line runs north to south (see Figures 2-1 and 4-3). The line PLA-776 previously carried low-level radioactive waste from the CPP-603 (Fuel Storage) waste tank, SFE-126, to the process equipment waste (PEW) evaporator feed tank, WL-133. The source of the radioactive contamination was the cleanup system for the CPP-603 basin water. Fission products (Cs, Sr, I) and small amounts of U and Pu (accounts for the observed alpha contamination) were released into the basin water from damaged fuel elements and were gathered up by the water treatment system. The rupture resulted in the release of about 2.5 gal (9.4 L) of low-level radioactive liquid waste. The release was contained within the excavation hole by an immediate temporary corrective action to prevent the liquid from draining out (the line was bent up and sealed with tape) and the line was monitored for radioactivity (about 7 cpm alpha and 20,000 cpm beta-gamma). All contaminated soil above background (during the time of the release, 1987, typical background levels at cold INTEC areas were 300 cpm beta-gamma[a]) was collected and packaged for disposal as radioactive waste at the Radioactive Waste Management Complex (RWMC). Standard practices mandated that health physics surveys be conducted throughout the removal action to identify all contaminated soil (WINCO 1992b).

Further correction included excavating the pipe 10 ft beyond the designated excavation limit and permanently capping the abandoned pipe in-place with compatible materials based on standard practices. The broken line, excavated line, and soil with activity above background were bagged for disposal as radioactive waste at the RWMC (Critique Report No. 87129, Reference 1, WINCO [1992b]). Where the

[a] Phone conversation between Cindy Klassy, BBWI, and Steve Aitken, BBWI, June 11, 2001.

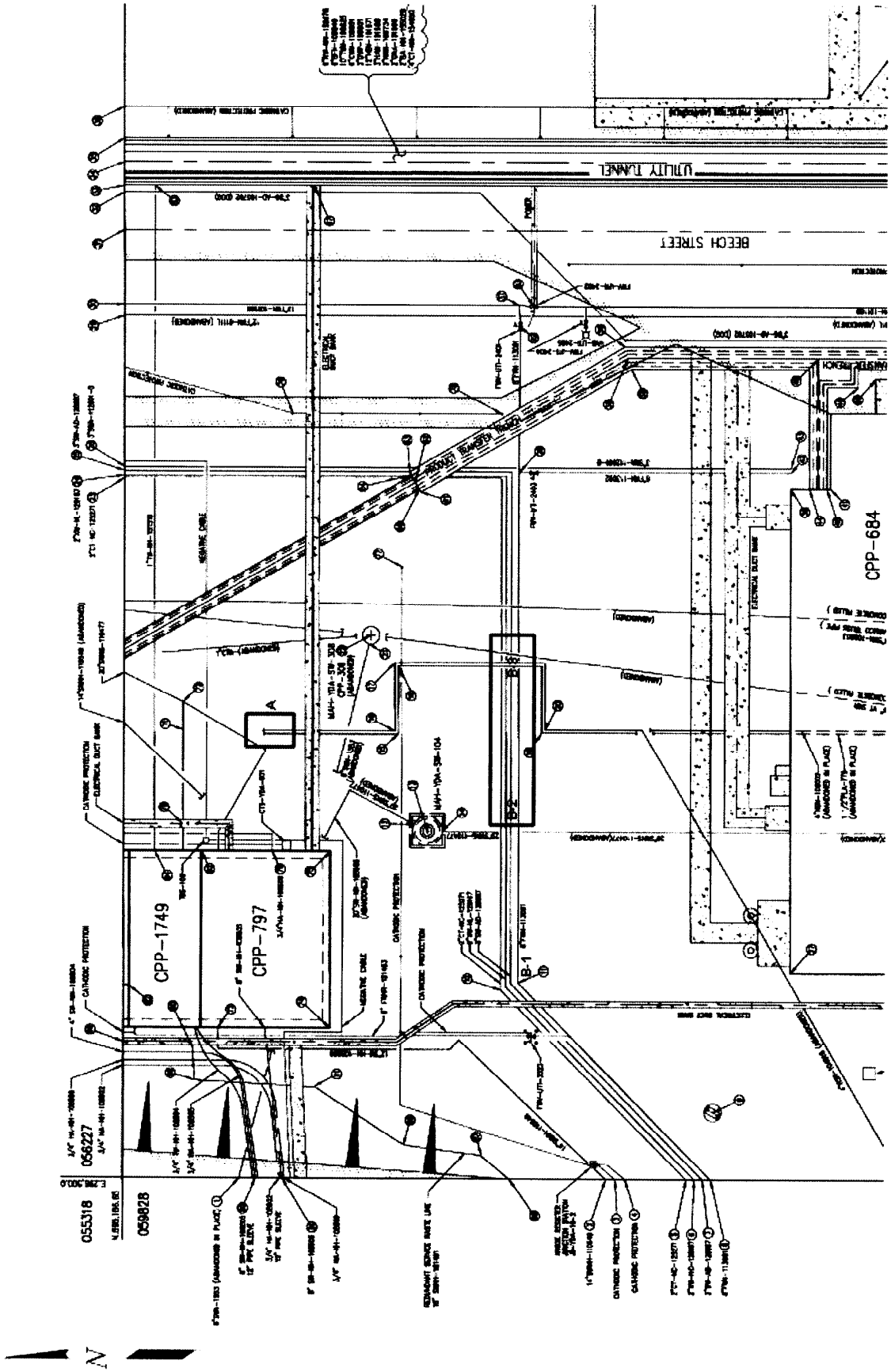

Figure 4-1. Schematic showing Locations A, B-1, B-2, and B-3 of Site CPP-82.

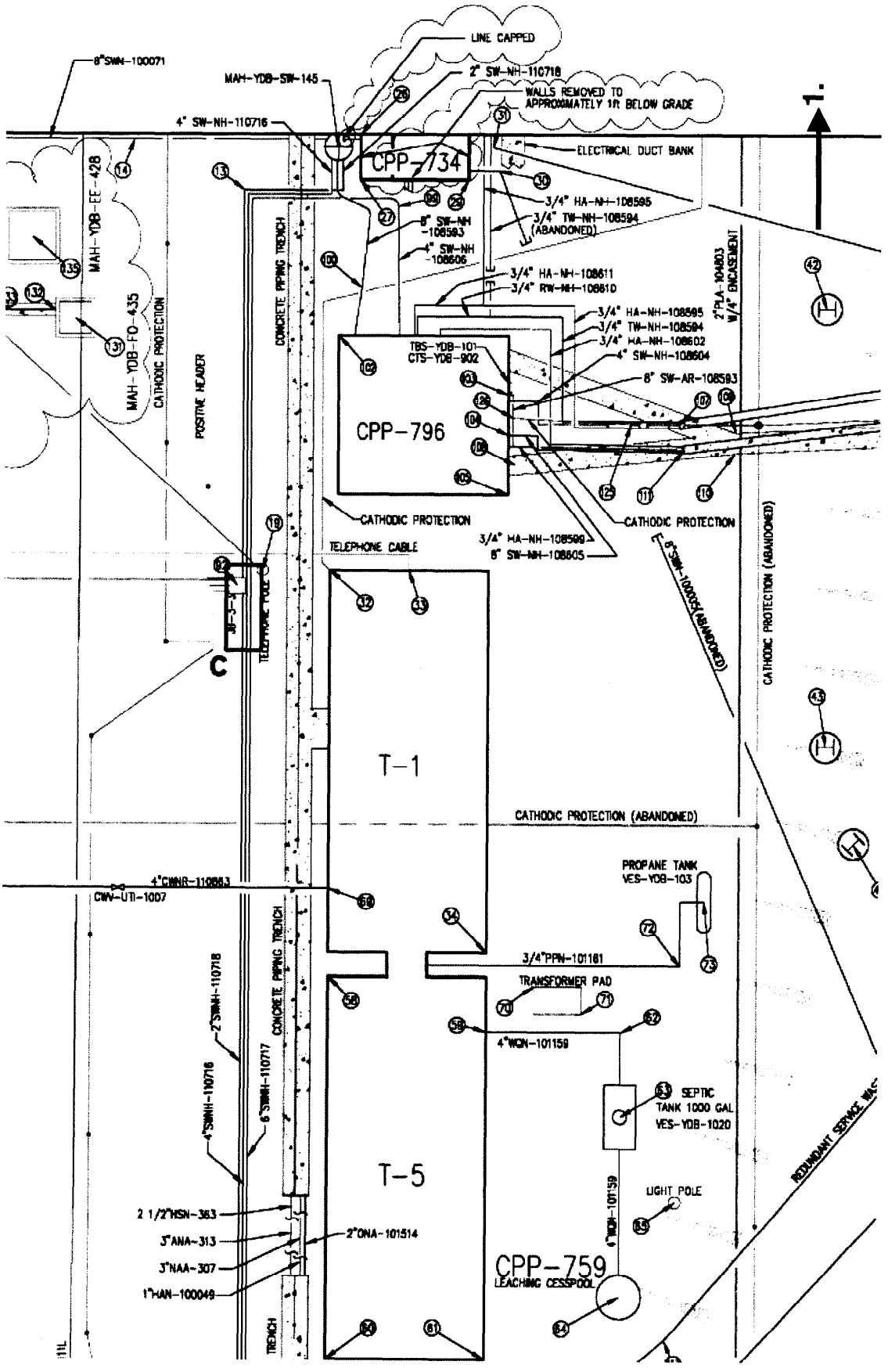

Figure 4-2. Schematic showing Location C of Site CPP-82.

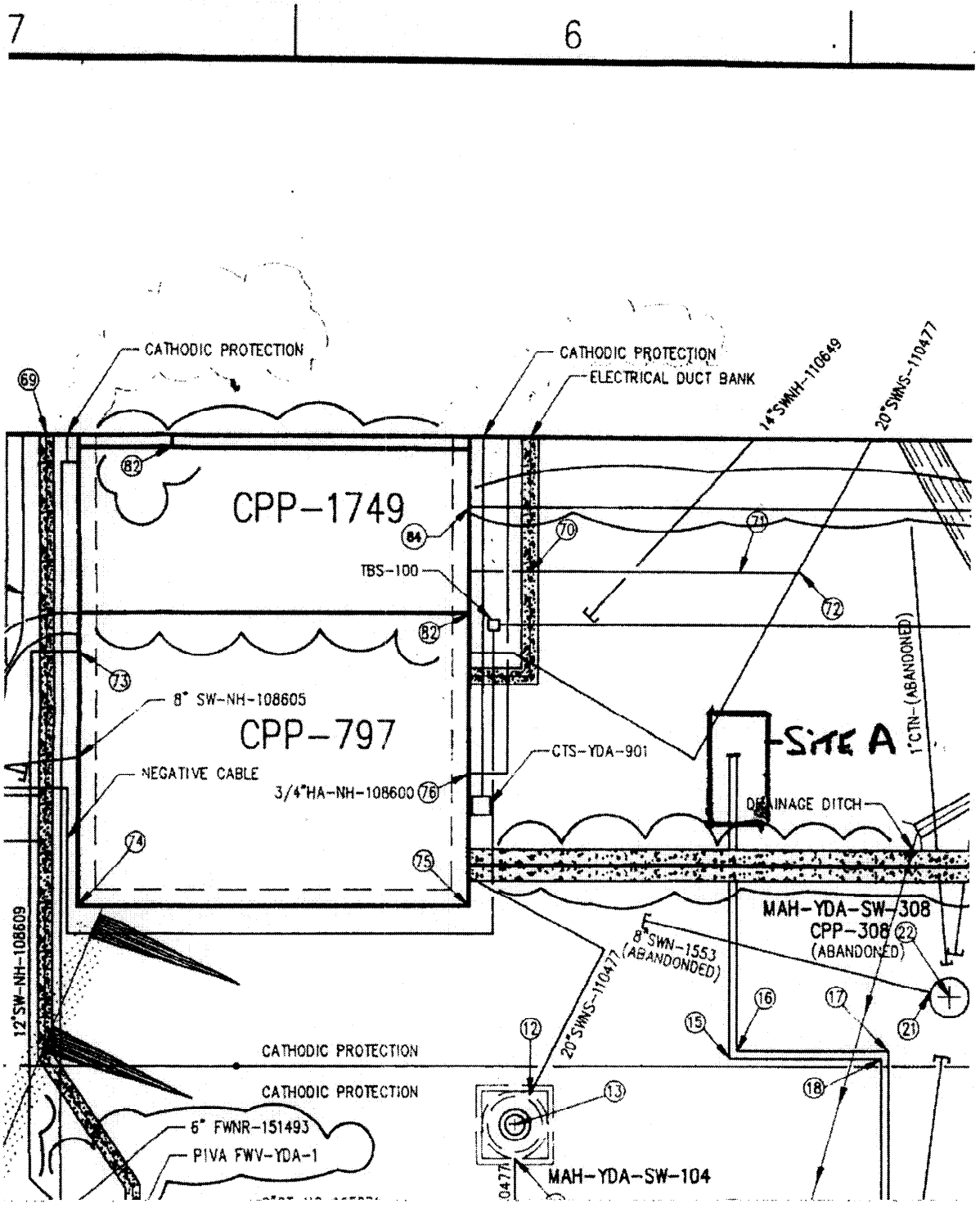

Figure 4-3. Schematic from Track 1 (WINCO 1992b) showing Location (Site) A.

spilled liquid was small (2.5 gal) and localized, it was easily identifiable for removal (memo in Reference 7, WINCO [1992b]). Following the corrective action, the site was surveyed to ensure that all contaminated soil above background was identified for removal from the excavation area (Reference 6, WINCO [1992b]).

A Track 1 risk assessment was conducted to establish risk-based soil screening concentration for the contaminants (i.e., cesium, strontium, iodine) and potential contaminants (i.e., cadmium, trichloroethylene (TCE), and mercury) linked to liquid waste which flowed through line PLA-776 (Reference 9, WINCO [1992b]). The later constituents were probably included in the risk assessment because they possibility could have been present in amounts below RCRA hazardous levels.

Historically, cadmium and TCE, below RCRA hazardous levels, had been identified in the SFE tank sludges. The source for the cadmium would be from cadmium (nuclear poison) leaching off the fuel storage racks in the CPP-603 basin. The cadmium was removed from the basin water by an ion exchange system and the spent resins were sent to the SFE tanks (i.e., SFE-126). Thus, small quantities of cadmium not removed by ion exchange resin could have been present in line PLA-776 waste water. Some Oakite solutions contained TCE. The Oakite was used to decontaminate the fuel shipping and handling casks; this resulted in the potential for TCE contamination in the CPP-603 basin water and thus in the PLA-776 line.

There were no identified sources for mercury in CPP-603, and this contaminant is not likely to have been present in the waste water passing through line PLA-776. Mercury may have been included in the risk assessment because instruments used at INTEC contained mercury.

4.3 Incident at Location B

On September 2, 1987, during the corrective action activities associated with Location A, a similar situation occurred at three locations called B-1, B-2, and B-3. Based on personnel interviews, approximately 25 gal of service wastewater may have been released at location B-2 (Reference 6, WINCO [1992b]). There were no releases at B-1 or B-3. The situation involved four parallel underground lines (CT-NC-125271, XW-NC-129167, SW-AD-128987, and FWN-113091) that are located south of CPP-797 and run east to west. These lines carried service wastewater from the Fluorinel Dissolution Process and Fuel Storage (FAST) Facility in Building CPP-666 to valve box DVB-YDA-SW-D12 along Beech Avenue and then to service waste building CPP-734 (replaced by CPP-797). Here, the solution in the lines was monitored, combined, and released to the service waste system. In this incident, three of the lines were damaged at separate locations, designated as B-1, B-2, and B-3, when they were struck by equipment (Figures 4-1 and 4-4). The fourth line, 8 in.-FWN-113091, was not damaged; it contained fire water (raw water). The three damaged lines are discussed below:

- **Location B-1:** There was no release at this location, which involved the 3-in. service waste line, SW-AD-128987. This line was contacted and deformed but not ruptured in the incident. Therefore, no liquid or contamination was released in the incident. The deformed section was later replaced. Location is approximately 30 ft south of CPP-797.

- Line SW-AD-128987 is a service waste line that originates in CPP-666 (FAST). It contained once-through cooling water from heat exchangers and vessel cooling jackets. This water does not contact any process fluids and remains as pure treated water until disposal. Therefore, the water in the line is nonhazardous and nonradioactive. This line could also carry floor drainage from the truck receiving area of CPP-666. Basin water from the fluorinel dissolution process (FDP), which was kept free of chemicals and radionuclides during the time of this incident, could also enter this line if the pressure relief valve discharged on the basin recirculation pumps.

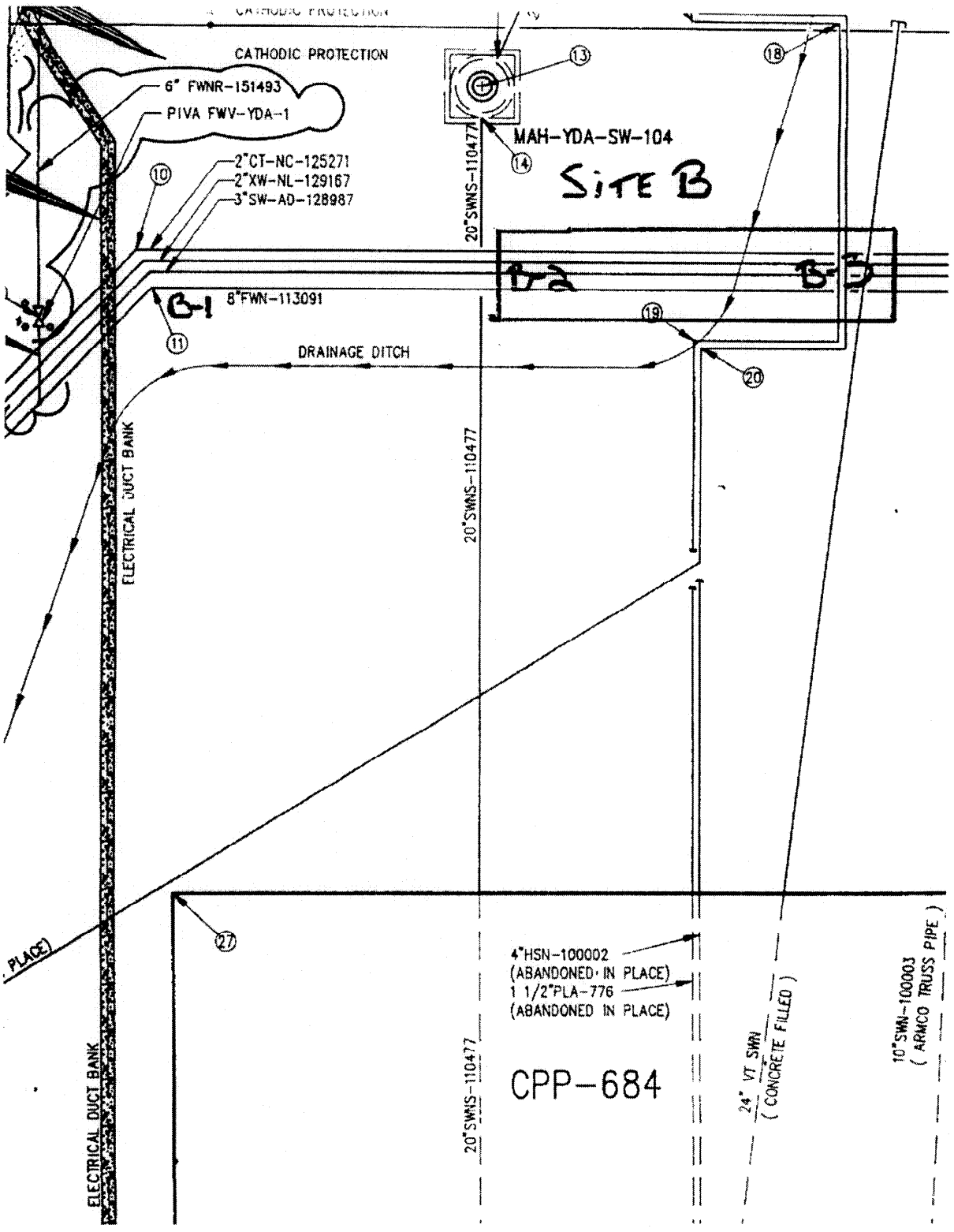

Figure 4-4. Schematic from WINCO (1992b) showing Location (Site) B.

- **Location B-2:** At this location, approximately 30 ft south of the southeast corner of CPP-797, two lines were intercepted and at least one of the lines led to a release. The 2-in. plastic line XW-NL-129167 was torn and made useless; a small quantity, about 25 gal of water (nonhazardous, nonradioactive) was released. Immediate corrective action involved tagging the line out of service. The damaged section was replaced.

  The 2-in. plastic line XW-NL-129167 carried water (at approximately pH = 7) from the FDP basin water treatment processes (ion exchange and reverse osmosis), which was collected in tank VES FT-135 in CPP-666, to the service waste system. This water would have contained some amount of sodium chloride (nonhazardous). Any strong acids or bases used to regenerate ion exchange resins were neutralized before release from the facility. The chemicals nitric acid, hydrochloric acid, sodium hydroxide, and oxalate were added to neutralize the pH. The pH of the wastewater leaving the CPP-666 water treatment system was controlled to ensure that it did not meet the hazardous criteria for corrosivity. It would have been an abnormal event for these neutralizing chemicals to have been at or above RCRA hazardous levels.

  The second line, a 2-in. steam condensate line, CT-NC-125271, which transported nonhazardous, nonradioacive steam condensate from CPP-666 to the service waste system was damaged. The damaged portion of the line was replaced.

  Line CT-NC-125271 is a steam condensate line that originates in CPP-666. It contained once-through steam condensate from steam heat exchangers and vessel heating jackets. The condensate was also collected from high-pressure and low-pressure steam headers. This steam did not contact any process fluids and remained as treated water with a small amount of a nonhazardous amine corrosion inhibitor additive.

- **Location B-3:** At this location, the 2-in. line CT-NC-125271 was deformed but not ruptured. Therefore, no liquid was released. The deformed section was later replaced. The previous bullet discusses the steam condensate contained in this line.

In repairing the lines discussed above, the lines were hydrotested to ensure their integrity after being replaced and foam plastic was placed over the line bonds as needed.

4.4 Incident at Location C

The incident at Location C (Figures 4-2 and 4-5) is associated with a spill of nonradioactive, nonhazardous waste water; this spill occurred during the repair activities associated with Location A. Location C is located approximately 10 ft west of the northwest corner of CPP-T1 and runs parallel to three plastic underground service waste lines: SW-NH-110716 (4-in. line), SW-NH-110717 (6-in. line), and SW-NH-110718 (2-in. line). On September 2, 1987, a backhoe struck and ruptured lines SW-NH-110717 and SW-NH-110718. At the time of the incident, only line SW-NH-110717 was in use.

The line, the 6-in. SW-NH-110717, was one of the main service waste pumpout routes from CPP-734 (after monitoring) to the percolation ponds, serving the west side of the service waste collection system. Waste in this line had received all the monitoring and sampling that it would ever get upstream of the rupture. The line was in service at the time of the break, accounting for the large volume of discharge (approximately 500 gal) (Reference 6, WINCO [1992b]). Although the flow was curtailed as much as possible, the SW-NH-110717 line discharged into the excavation hole due to backflow from CPP-709 pumps (east side of service waste system) until temporary repairs were made. During repairs, the liquid waste was monitored and sampled; it was found to be nonradioactive and pumped to the Idaho Chemical Processing Plan (ICPP) Drainage Ditch System (see following paragraph). (Note: ICPP is now the Idaho Nuclear Technology and Engineering Center [INTEC]) Permanent repairs were made at a later date (Critique Report No. 87130, Reference 2, WINCO [1992b]). The composite sample for the month

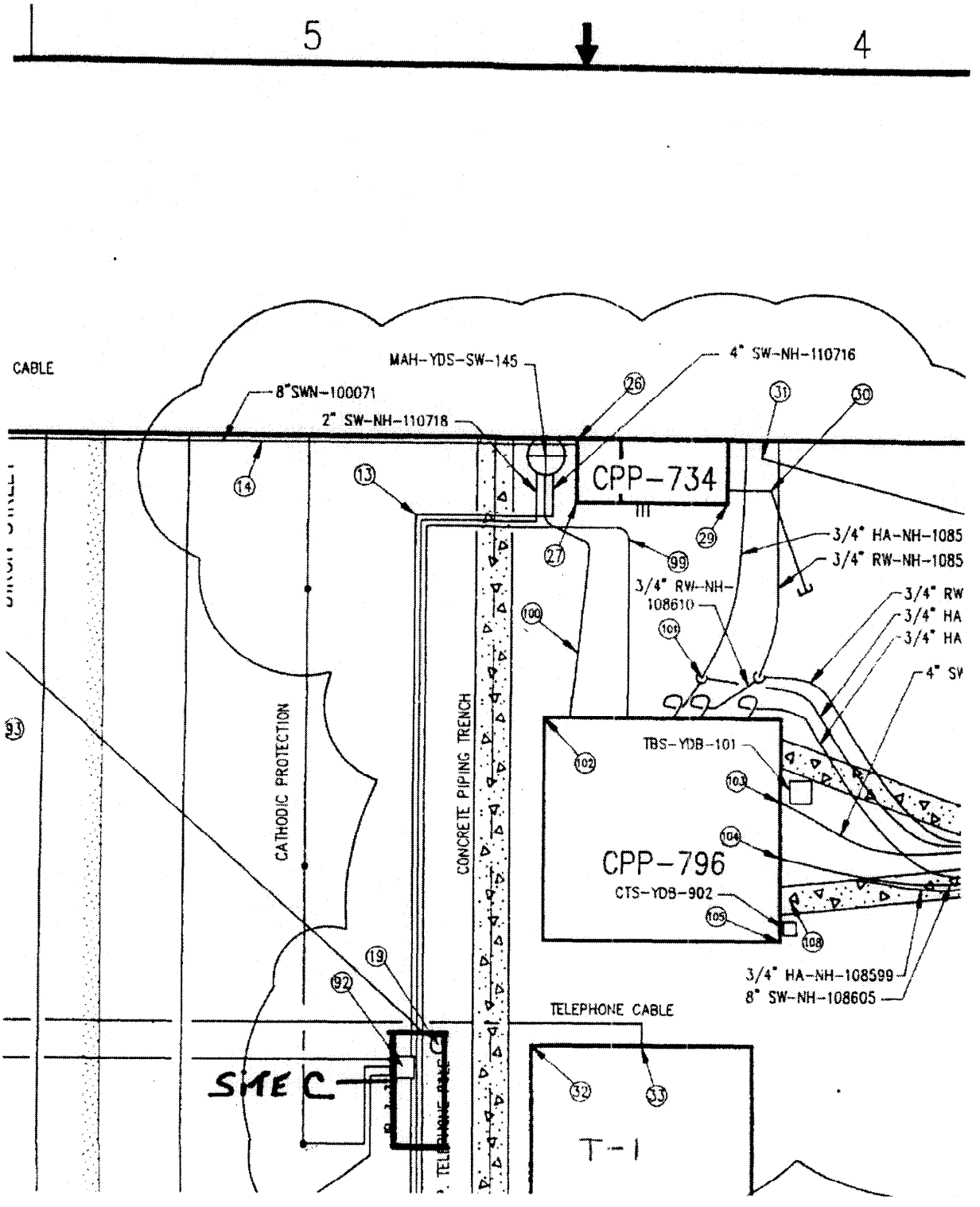

Figure 4-5. Schematic from WINCO (1992b) showing Location (Site) C.

preceding the rupture (August 1987) showed that RCRA hazardous metals were all <0.5% of their respective toxicity levels (Reference 8, WINCO [1992b]). This gives good reason to believe that no hazardous materials were released. Any potential contaminants would be below the limits requiring a risk assessment (see Contaminant Worksheet for Location C, WINCO [1992b]).

The ICPP (INTEC) drainage ditch referred to in the previous paragraph is part of the storm water drainage system, which directs surface runoff toward the NE corner of INTEC. This system is currently being upgraded to improve drainage capability to prevent stormwater from soaking into the ground near the INTEC tank farm. The ditches are normally dry, but sometimes receive steam condensate from outlying buildings. One ditch section upstream (SW) of Location C often contained standing warm water from leaking steam traps.

The line, the 2-in. SW-NH-110718, which runs from the reverse osmosis system in CPP-603 to CPP-734 for monitoring, was not in service at the time it was damaged, so no immediate release to the environment from this line occurred. In addition, it was initially believed that the line was not ruptured, so it was returned to service. It then leaked into the excavation, but a much smaller amount than released from line SW-NH-110717 (possibly 10-20 gal). The reverse osmosis unit was used to prepare makeup water for addition to the CPP-603 basins. The liquid in the line was the reject stream that contains the minerals from the groundwater, in somewhat more concentrated form. There is no reason to suspect hazardous materials were transferred in this line. The minerals are those normally found in water (Reference 5, WINCO [1992b]).

4.5 Document History

The Track 1 decision documentation (WINCO 1992b), approved in 1993, determined that no further action is required with regard to Site CPP-82. This determination was evaluated and approved by DOE-ID, IDEQ, and EPA Region X. The decision to transfer this "No Further Action" site to OU 3-14 for further evaluation was made in the OU 3-13 ROD. The document also notes that it is anticipated that a final decision can be reached based on documented historical information.

4.6 Site Evaluation

Decision drivers for the Track 1 (WINCO 1992b) included the removal of contamination at Location A and the historical process knowledge and data that make it extremely unlikely that service wastewaters that were released at Locations B-2 and C were above RCRA hazardous limits.

4.6.1 Nature and Extent of Remaining Contamination

The locations identified as Site CPP-82 where there could be remaining contamination are Location A, B-2, and C. At these locations lines did rupture and liquid was released. These release sites are summarized below.

Location A

- All contaminated soil above background (typical INTEC cold area background level in 1987 was 300 cpm) was collected and packaged for disposal as radioactive waste at the RWMC. Standard practices mandated that health physics surveys be conducted throughout the removal action to identify all contaminated soil (WINCO 1992b).
- A Track 1 risk assessment was performed to establish risk-based soil screening concentrations for the contaminants (i.e., cesium, strontium, iodine) and potential contaminants (i.e., cadmium, TCE, and mercury) linked to the 2.5 gal of liquid waste released from line PLA-776 (Reference 9, WINCO [1992b]). Table 4-1 is a reprint of the risk-based soil screening concentrations from the Track 1. Calculations of these concentrations were done according to DOE-ID (1992). The later constituents were probably included in the risk assessment because there was the possibility they could have been present, however, in amounts below RCRA hazardous levels.

Table 4-1. Summary tables of risk-based soil screening concentrations.

CPP-82 contamination for cadmium

	Scenarios			
	Occupational		Residential	
Exposure Pathways	Soil Concentration at 1E-06 Risk (mg/kg)	Soil Concentration at HQ-1 (mg/kg)	Soil Concentration at 1E-06 Risk (mg/kg)	Soil Concentration at HQ-1 (mg/kg)
Soil ingestion	2.0E+03	1.8E+05	ND	2.7E+02
Inhalation of fugitive dust	5.4E+03	ND	6.3E+05	ND
Inhalation of volatiles	NA	NA	ND	ND
Groundwater ingestion	NA	NA	ND	4.6E+02

NA = Not applicable.
ND = Toxicity values have not be determined.
Shaded box = Lowest risk-based concentration.

CPP-82 contamination for mercury

	Scenarios			
	Occupational		Residential	
Exposure Pathways	Soil Concentration at 1E-06 Risk (mg/kg)	Soil Concentration at HQ-1 (mg/kg)	Soil Concentration at 1E-06 Risk (mg/kg)	Soil Concentration at HQ-1 (mg/kg)
Soil ingestion	ND	6.1E+02	ND	8.2E+01
Inhalation of fugitive dust	ND	1.0E+06	ND	7.2E+05
Inhalation of volatiles	NA	NA	NA	NA
Groundwater ingestion	NA	NA	ND	1.7E+05

NA = Not applicable.
ND = Toxicity values have not be determined.
Shaded box = Lowest risk-based concentration.

Table 4-1. (continued).

CPP-82 contamination for trichloroethylene (TCE)

	Scenarios			
	Occupational		Residential	
Exposure Pathways	Soil Concentration at 1E-06 Risk (mg/kg)	Soil Concentration at HQ-1 (mg/kg)	Soil Concentration at 1E-06 Risk (mg/kg)	Soil Concentration at HQ-1 (mg/kg)
Soil ingestion	5.2E+02	ND	5.8E+01	ND
Inhalation of fugitive dust	1.9E+06	ND	1.2E+06	ND
Inhalation of volatiles	ND	ND	NA	NA
Groundwater ingestion	NA	NA	1.52E+02	ND

NA = Not applicable.
ND = Toxicity values have not be determined.
Shaded box = Lowest risk-based concentration.

CPP-82 contamination for strontium-90

	Scenarios	
	Occupational	Residential
Exposure Pathways	Soil Concentration at 1E-06 Risk (pCi/g)	Soil Concentration at 1E-06 Risk (pCi/g)
Soil ingestion	1.1E+01	1.2E+02
Inhalation of fugitive dust	8.2E+04	8.9E+05
Groundwater ingestion	NA	1.3E+10
External exposure	NA	NA

NA = Not applicable.
Shaded box = Lowest risk-based concentration.

Table 4-1. (continued).

CPP-82 contamination for iodine-129

	Scenarios	
	Occupational	Residential
Exposure Pathways	Soil Concentration at 1E-06 Risk (pCi/g)	Soil Concentration at 1E-06 Risk (pCi/g)
Soil ingestion	2.0E+00	2.0E+00
Inhalation of fugitive dust	3.8E+04	3.8E+04
Groundwater ingestion	NA	2.3E+00
External exposure	6.7E-02	6.7E-02

NA = Not applicable.
Shaded box = Lowest risk-based concentration.

CPP-82 contamination for cesium-137

	Scenarios	
	Occupational	Residential
Exposure Pathways	Soil Concentration at 1E-06 Risk (pCi/g)	Soil Concentration at 1E-06 Risk (pCi/g)
Soil ingestion	1.3E+01	1.3E+02
Inhalation of fugitive dust	2.4E+05	2.4E+06
Groundwater ingestion	NA	2.7E+221*
External exposure	3.0E-02	3.0E-02

NA = Not applicable.
Shaded box = Lowest risk-based concentration.
* Soil concentration for groundwater pathway, as calculated by GWSCREEN based on a $K_d = 500$, is greater than the activity of pure cesium.

Location B-2

- The 2-in. plastic line XW-NL-129167 was torn and made useless; a small quantity, about 25 gal, of water (nonhazardous, nonradioactive) was released. Any strong acids or bases used to regenerate ion exchange resins were neutralized before release from the facility. The chemicals nitric acid, hydrochloric acid, sodium hydroxide, and oxalate were added to neutralize the pH. The pH of the wastewater leaving the CPP-666 water treatment system was controlled to ensure that it did not meet the hazardous criteria for corrosivity. It would have been an abnormal event for these neutralizing chemicals to have been at or above RCRA hazardous levels. No risk assessment data are provided for these chemicals.

- The second line, the 2-in. steam condensate line CT-NC-125271, which transported nonhazardous, nonradioacive steam condensate from CPP-666 to the service waste system was damaged. The damaged portion of the line was replaced. This steam condensate did not contact any process fluids and remained as treated water. As such, it would not contibure to any potential remaining contaminants. The amine corrosion inhibitor is nonhazardous. No risk assessment data are provided for this inhibitor.

Location C

- The line, the 6-in. SW-NH-110717, was one of the main service waste pumpout routes from CPP-734 (after monitoring) to the percolation ponds, serving the west side of the service waste collection system and accounts for about 500 gal of liquid released, that was subsequently discharged to the ICPP Drainage Ditch System. The composite sample for the month preceding the rupture (August 1987) showed that RCRA hazardous metals were all <0.5% of their respective toxicity levels (Reference 8, WINCO [1992b]). This gives good reason to believe that no hazardous materials were released. Any potential contaminants would be below the limits requiring a risk assessment (Contaminant Worksheet for Location C, WINCO [1992b]).

- The line, 2-in. SW-NH-110718, which runs from the reverse osmosis system in CPP-603 to CPP-734 for monitoring, leaked into the excavation at Location C, but was a much smaller amount than released from line SW-NH-110717 (possibly 10-20 gal). The reverse osmosis unit was used to prepare makeup water for addition to the CPP-603 basins. The liquid in the line was the reject stream that contains the minerals from the groundwater, in somewhat more concentrated form. There is no reason to suspect hazardous materials were transferred in this line. The minerals are those normally found in water (Reference 5, WINCO [1992b]). No contaminant risk assessment was done for these minerals.

4.6.2 Contaminant Risk

The Track 1 for CPP-82 included a risk assessment to establish risk-based soil screening concentration for the contaminants (i.e., cesium, strontium, iodine) and potential contaminants (i.e., cadmium, TCE, and mercury) linked to the 2.5 gal of liquid waste released from line PLA-776 (Reference 9, WINCO [1992b]). Table 4-1 is a reprint of the risk-based soil screening concentrations from the Track 1. In addition, it is documented in the Track 1 that all contaminated soil above background (typical INTEC cold area background level in 1987 was 300 cpm) was collected and packaged for disposal as radioactive waste at the RWMC. Standard practices mandated that health physics surveys be conducted throughout the removal action to identify all contaminated soil (WINCO 1992b).

To assess the risk at CPP-82 from residual contaminants not addressed in the Track 1, the PRGs from EPA Region IX were used (EPA 2000). The PRGs are Agency guidelines, not legally enforceable standards. They are used for site "screening" and as initial cleanup goals if applicable.

The PRGs contained in the Region IX PRG table are generic; they are calculated without site-specific information. They can be used to screen a site to determine whether further evaluation is appropriate. Exceeding a PRG suggests that further evaluation (i.e., additional sampling) of the potential risks that may be posed at the site is appropriate. Region IX PRG concentrations are based on exposure pathways for which generally accepted methods, models, and assumptions have been developed (i.e., ingestion, dermal contact, and inhalation) for specific land-use conditions and do not consider impact to groundwater or ecological receptors. The PRGs are chemical concentrations that correspond to fixed levels of risk [i.e., either a one-in-one-million (10^{-6}) cancer risk or a noncarcinogenic hazard quotient of 1 in soil, air, and water].

The most conservative concentrations giving a 10^{-6} cancer risk and a HQ equal to 1 for the potential contaminants that could be remaining in the soil are presented in Tables 4-2 and 4-3 for residential and industrial scenarios, respectively. The risk represented by any potential contaminants that could be remaining as a residual in the soil is not likely to be in excess of 1E-06 or a HQ = 1 for the residential and industrial preliminary remediation goal (see Tables 4-2 and 4-3).

Table 4-2. The contaminant concentrations [mg/kg (ppm)] for residential soil—10^{-6} cancer risk and HQ = 1 (adapted from EPA 2000).

	Residential Soil							
	Cancer Risk = 1E-06				Chronic HQ = 1			
Contaminant	Soil-inhale (mg/kg)	Soil-dermal (mg/kg)	Soil-ingest (mg/kg)	Integrated (mg/kg)	Soil-inhale (mg/kg)	Soil-dermal (mg/kg)	Soil-ingest (mg/kg)	Integrated (mg/kg)
Trichloroethylene (TCE)	2.9E+00	—	5.8E+09	2.8E+00	2.4E+01	—	4.7E+01	2.3E+01
Arsenic (noncancer endpoint)	—	—	—	—	—	2.8E+01	2.3E+01	2.2E+01
Arsenic (cancer endpoint)	5.9E+02	4.5E+00	4.3E-01	3.9E-01	—	2.8E+02	2.3E+01	2.2E+01
Barium	—	—	—	—	2.9E+05	—	5.5E+03	5.4E+03
Cadmium and compounds	1.4E+3	—	—	1.4E+3	—	7.0E+02	3.9E+01	3.7E+01
Chloride	—	—	—	—	—	—	—	—
Fluoride	—	—	—	—	—	1.7E+04	4.7E+03	3.7E+03
Lead	—	—	—	—	—	—	—	—
Mercury and compounds	—	—	—	—	—	—	2.3E+01	2.3E+01
Nitrate	—	—	—	—	—	—	—	—
Selenium	—	—	—	—	—	—	3.9E+02	3.9E+02
Silver and compounds	—	—	—	—	—	—	3.9E+02	3.9E+02
Sulfate	—	—	—	—	—	—	—	—

a. — = No data available.

Table 4-3. The contaminant concentrations [mg/kg (ppm)] for industrial soil—10^{-6} cancer risk and HQ = 1 (adapted from EPA 2000).

	Industrial Soil							
	Cancer Risk = 1E-06				Chronic HQ = 1			
Contaminant	Soil-inhale (mg/kg)	Soil-dermal (mg/kg)	Soil-ingest (mg/kg)	Integrated (mg/kg)	Soil-inhale (mg/kg)	Soil-dermal (mg/kg)	Soil-ingest (mg/kg)	Integrated (mg/kg)
Trichloroethylene (TCE)	6.2E+00	—	5.2E+02	6.1E+00	8E+01	—	1.2E+04	7.9E+01
Arsenic (noncancer endpoint)	—	—	—	—	—	1.5E+03	6.1E+02	4.4E+02
Arsenic (noncancer endpoint)	1.3E+03	9.6E+00	3.8E+00	2.7E+00	—	1.5E+03	6.1E+02	4.4E+02
Barium and compounds	—	—	—	—	9.6E+05	—	9.4E+05	1.2E+05
Cadmium and compounds	3.0E+03	—	—	3.0E+03	—	3.9E+03	1.0E+03	8.1E+02
Chloride	—	—	—	—	—	—	—	—
Floride	—	—	—	—	—	9.3E+04	1.2E+05	5.3E+04
Lead	—	—	—	—	—	—	—	—
Mercury and compounds	—	—	—	—	—	—	6.1E+02	6.1E+02
Nitrate	—	—	—	—	—	—	—	—
Selenium	—	—	—	—	—	—	1.0E+04	1.0E+04
Silver	—	—	—	—	—	—	1.0E+04	1.0E+04
Sulfate	—	—	—	—	—	—	—	—

a. — = No data available.